A.D. 1852 . . . . . N° 1027.

SPECIFICATION

OF

WILLIAM SORRELL.

FURNACES AND FIRE-PLACES.

LONDON:
PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
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1854.

A.D. 1852 . . . . . N° 1027.

Furnaces and Fire-places.

LETTERS PATENT to William Sorrell, of Kingsland, in the County of Middlesex, Engineer, for the Invention of "IMPROVEMENTS IN FURNACES AND FIRE-PLACES FOR CONSUMING SMOKE."

Sealed the 27th May 1853, and dated the 11th December 1852.

PROVISIONAL SPECIFICATION left by the said William Sorrell a the Office of the Commissioners of Patents, with his Petition, on the 11th December 1852.

I, WILLIAM SORRELL, of Kingsland, in the County of Middlesex, Engineer, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN FURNACES AND FIRE PLACES FOR CONSUMING SMOKE" to be as follows:—

I cause the smoke to be drawn from the shaft or chimney, and mixing it with atmospheric air, I make it pass through or over the fire. If two fires are used, I cause the smoke arising from one, after mixing atmospheric air with it, to pass through or over the other.

SPECIFICATION in pursuance of the condition of the Letters Patent, filed by the said William Sorrell in the Great Seal Patent Office on the 11th June 1853.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, WILLIAM SORRELL, of Kingsland, in the County of Middlesex, Engineer, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Eleventh day of December, in the year of our Lord One thousand eight hundred and fifty-two, in the sixteenth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said William Sorrell, Her special licence that I, the said William Sorrell, my executors, administrators, and assigns, or such others as I, the said William Sorrell, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "IMPROVEMENTS IN FURNACES AND FIRE PLACES FOR CONSUMING SMOKE," upon the condition (amongst others) that I, the said William Sorrell, by an instrument in writing under my hand and seal, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said William Sorrell, do hereby declare the nature of my said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, reference being had to the Drawings annexed (that is to say):

My Invention has for its object the consuming of the smoke arising from the combustion of fuel in fire places and furnaces; and this I do by causing the smoke to be drawn from the chimney or shaft of the fire place or furnace, and mixed with atmospheric air,

and in that state made to pass through or over the fire; when the oxygen of the air will enable the carbonaceous and other inflammable constituents of the smoke to be consumed, and an increased useful effect will thus be produced from a given quantity of fuel, as compared with cases in which the smoke is allowed to escape unconsumed.

Figure 1, of the accompanying Drawings is a front elevation of a steam boiler, shewing the two furnaces and apparatus in connection therewith, for carrying out my Invention. Figure 2, is a cross section of the same near the back end of the boilers. Figure 3, another cross section on the line A, B, of Figure 4. Figure 4, is a longitudinal section between the boilers, and Figure 5, a plan of the apparatus for working the valves or dampers. *a*, *a*, are the boilers; *b*, the return flue from the back end of the boilers, which is furnished with two dampers *s*, *s*, so that communication with either boiler can be shut off at pleasure; *c*, is a pipe leading from the flue to a fan *d*, for drawing away and mixing the smoke; *e*, is the outlet of the fan, which communicates with the passage *f*, between the boilers; e^1, is the air inlet to the fan; *g*, is a D slide, covering the mouth of the passage *h*, which has two outlets *i*, *i*, one for the ash pit of each boiler; *k*, *k*, are pipes from the slide *g*, to the ash pits or furnaces; which they put in communication with the flue *b*, alternately, according as the slide *g*, is shifted to one side or the other; *l*, is a pinion or toothed segment, by which the slide *g*, is worked; this pinion or segment is mounted on the lower end of the shaft l^1, and gears into a rack formed in the interior of the slide; the upper end of the shaft l^1, carries the lever *m*, which is connected by the rod m^3, to one arm of the bell crank lever m^1, which is mounted on the damper spindle n^1; the other arm of the bell crank is connected by the rod m^4, to the lever m^2, which is fixed on the damper spindle *u*; so the dampers *s*, *s*, are moved simultaneously but in opposite directions, the one being opened as the other is closed; *n*, *n*, are levers for shifting the dampers *t*, *t*, to which they are connected by the rods n^1, n^2, and levers n^3, n^4, the latter of which are mounted on the damper spindles n^2, n^3; the levers *n*, *n*, are mounted on spindles *o*, *o*, which are fixed at the hinged part of the furnace doors, and turn with them

when they are opened; the bosses of the levers n, n, are formed with clutches on the top, which correspond with other clutches p, p, by which the chimney dampers are alternately put into and out of gear. q, q, are levers (not shewn in Fig. 5), by which the clutches p, p, are moved. r, is a disc with two crank pins, to which the ends of the levers q, q, are attached by slotted holes, to allow the pins to traverse the turning of the disc, and consequent rising or falling of the levers q, q, disengages or engages the clutches, the one being put in gear as the other is thrown out. The disc r is caused to turn by means of the worm r^1, which gears into worm teeth cut on the edge of the disc. The worm r^1, is driven by a strap passing round the pulley r^2, from any prime mover. In the side of the pulley r^2, is formed a friction clutch, into which a corresponding clutch piece r^3, fits; and the pulley r^2, runs loose on its shaft, except when the clutch is engaged, which is effected by the closing of the furnace doors alternately; the clutch is thrown out by means of the lever r^4, which is connected by a chain to a weight r^5. The weight r^5, is also connected to the lever n^3, and another weight n^5, is connected to the lever n^4, for the purpose of opening the dampers t, t, when the clutches p, p, are disconnected, and also for throwing out the friction clutch r^3, and stopping the worm and disc r^1, and r. When the worm is driven by the friction clutch being in gear, the disc revolves, and the pin in its side lifts one of the levers q, and the clutch p, carried by that lever, which allows the weights to open the dampers t, t, alternately. A handle l^2, is fixed on the spindle l^1, for the purpose of enabling the spindle to be turned, and the dampers s, s, opened or closed, so as to form a communication to the fan d, and from thence to the opposite ash pit to that of the furnace from which the fan is drawing; the communication from the fan to the ash pit being made through either passage i, and pipe k, by means of the slide g, which is moved by the same action of the handle l^2. w, w, are the ashpit doors, which are kept always closed except when clearing out ashes. The air always has access to one of the furnaces, through the passage h, according to the position of the slide g, and after having passed through the fire, is drawn into the fan, and

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FIG. 1.

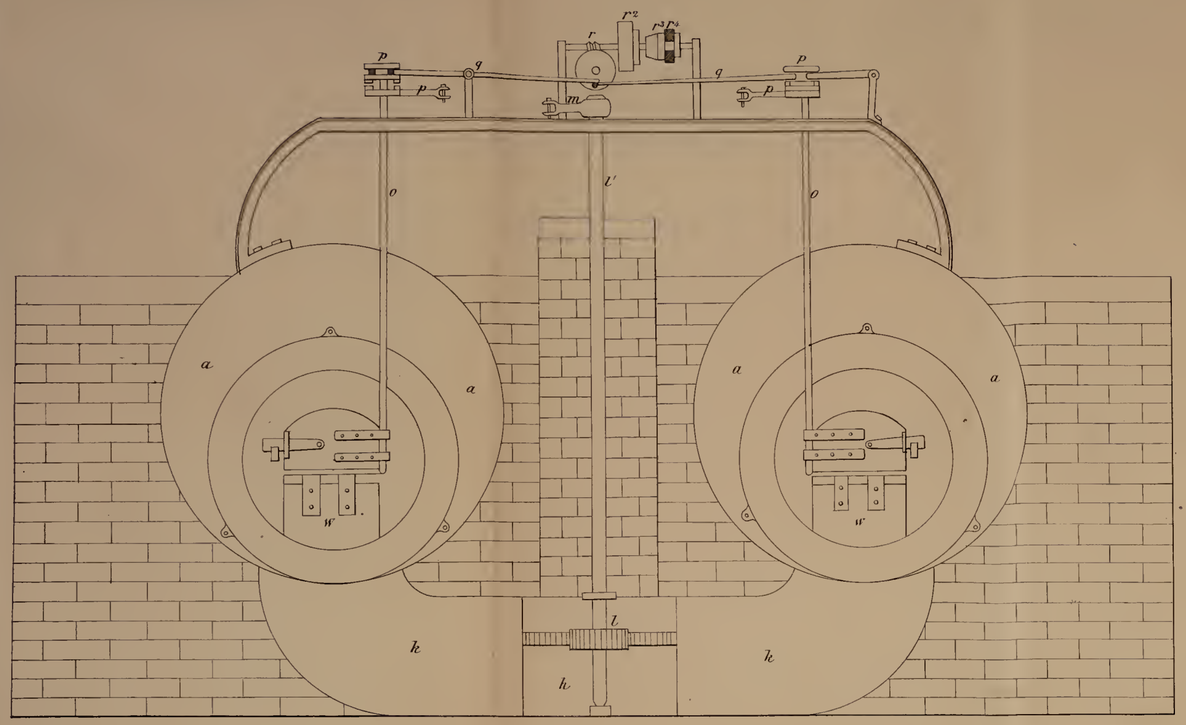


FIG. 2.

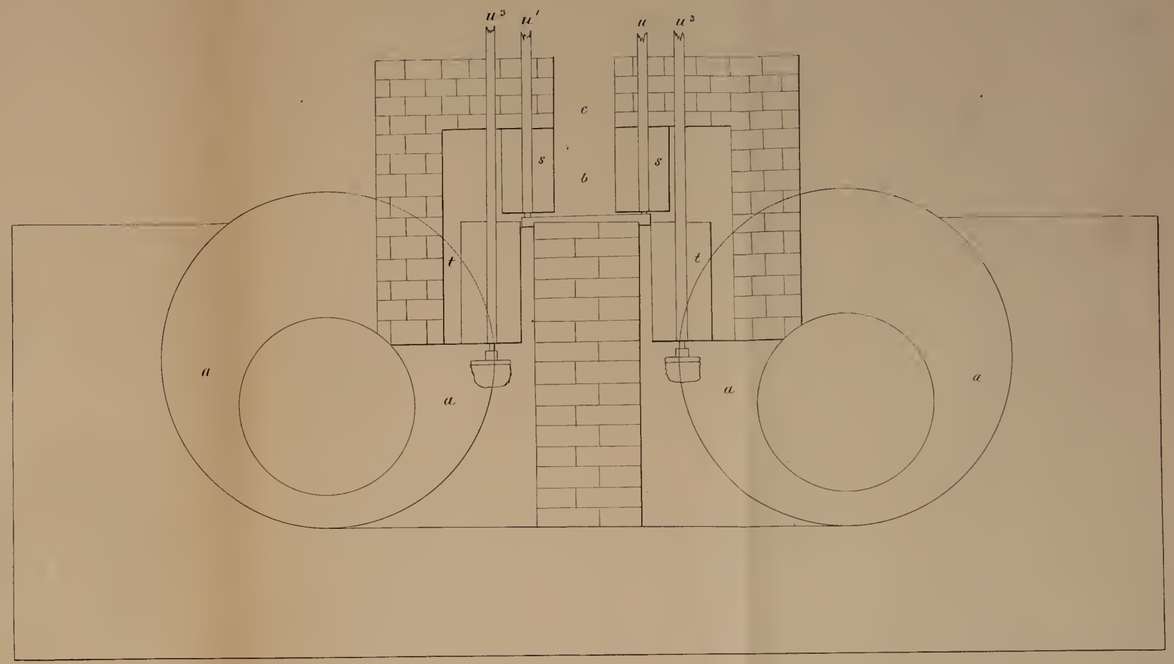


FIG. 3.

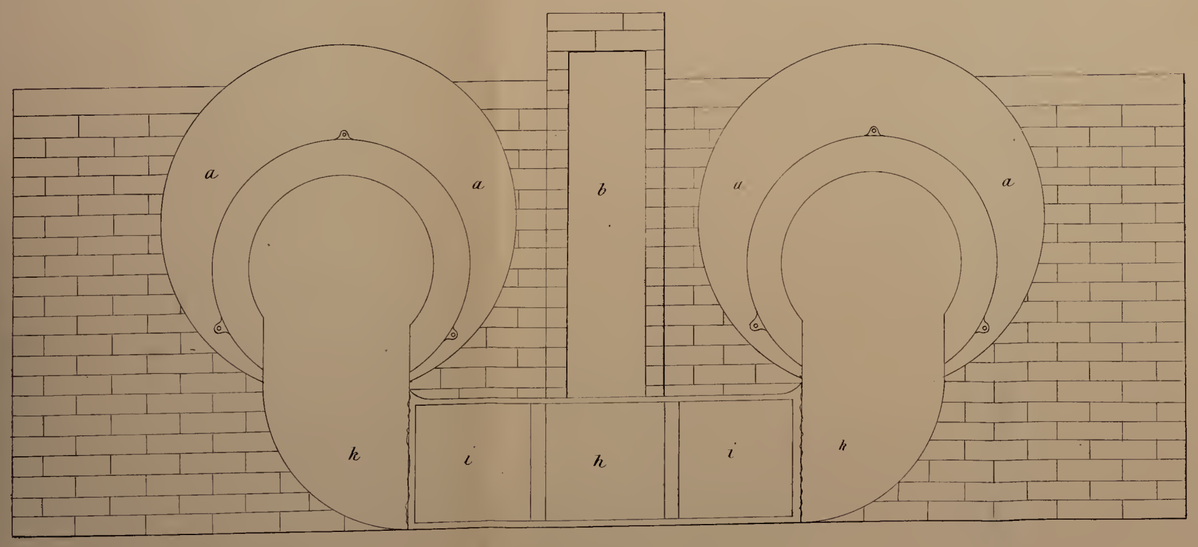
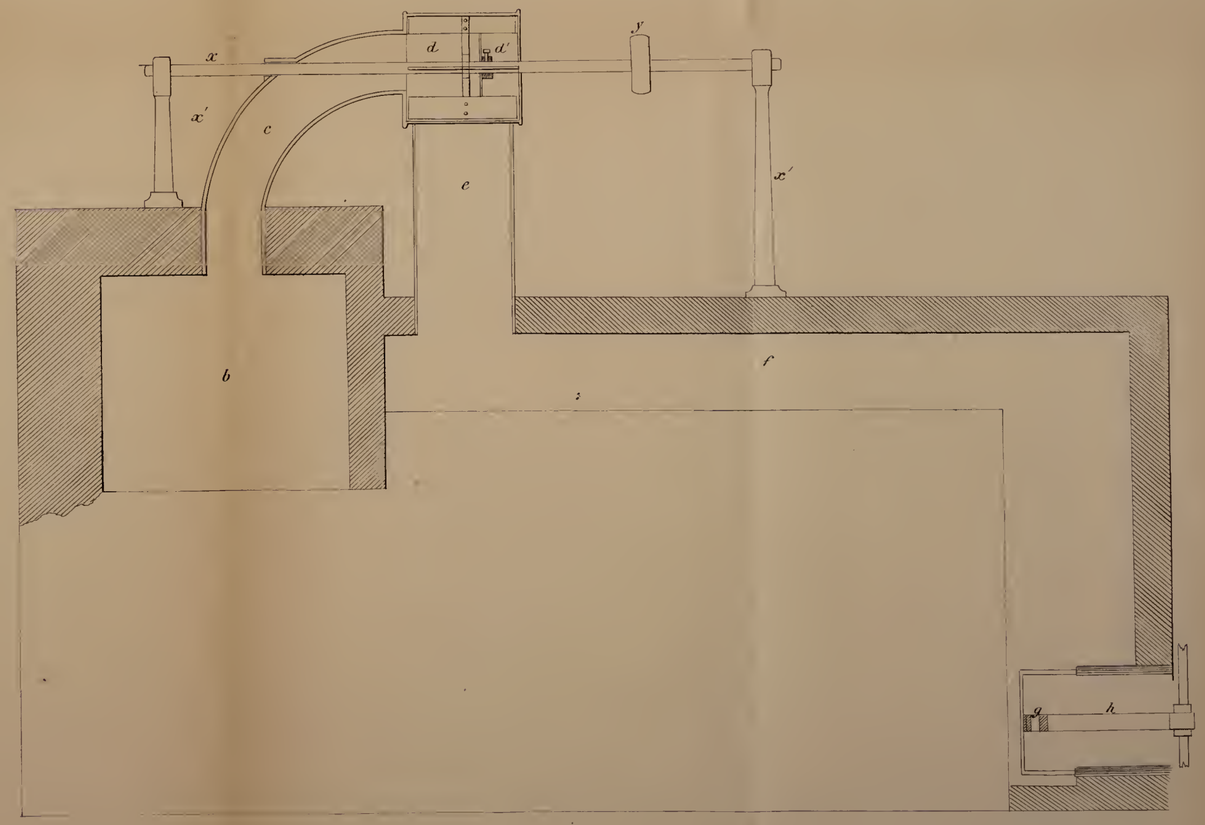


FIG. 4.



C.F. Cheffins. Litho

The filed drawing is not colored

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FIG. 5.

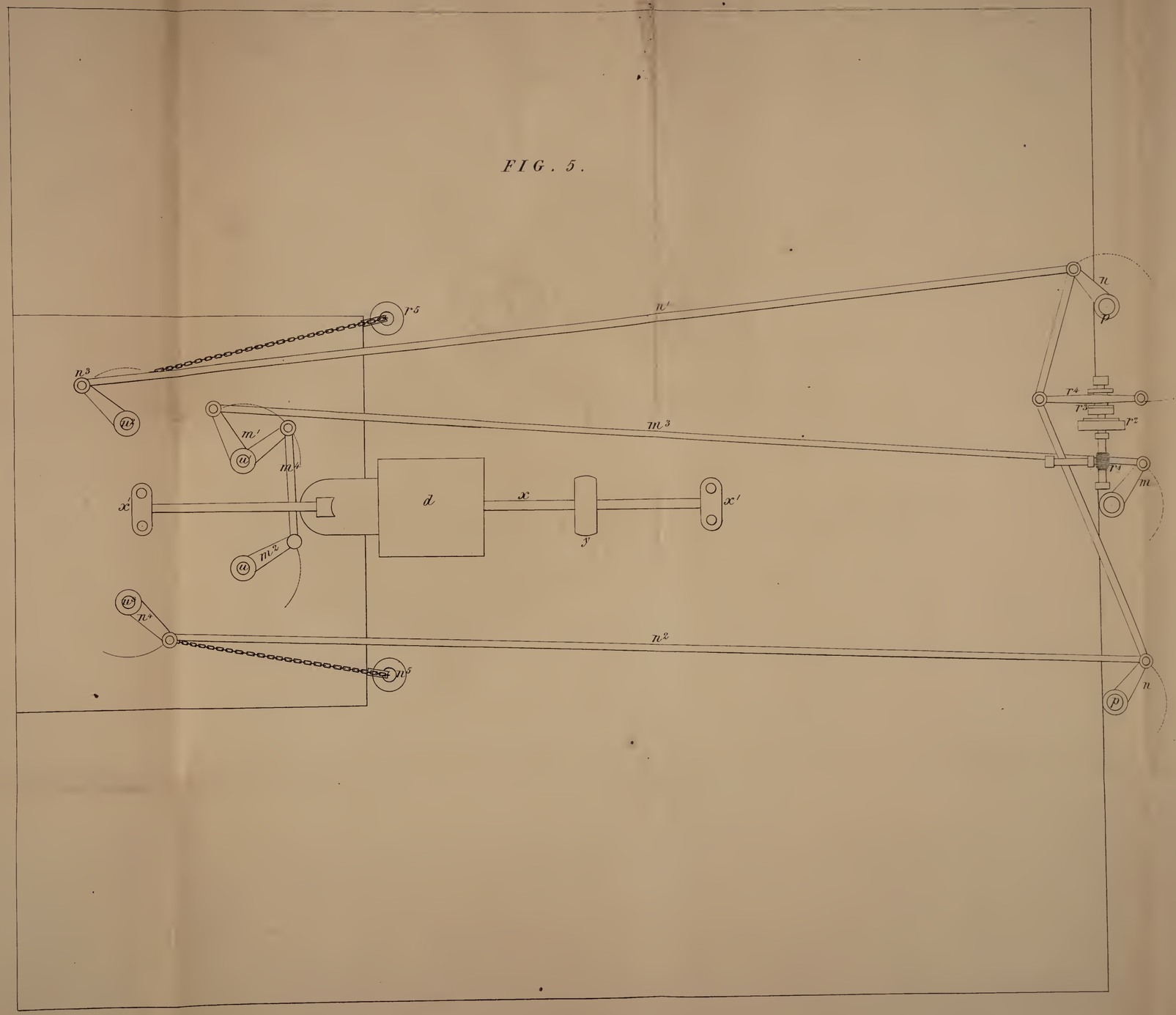

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FIG. 6.

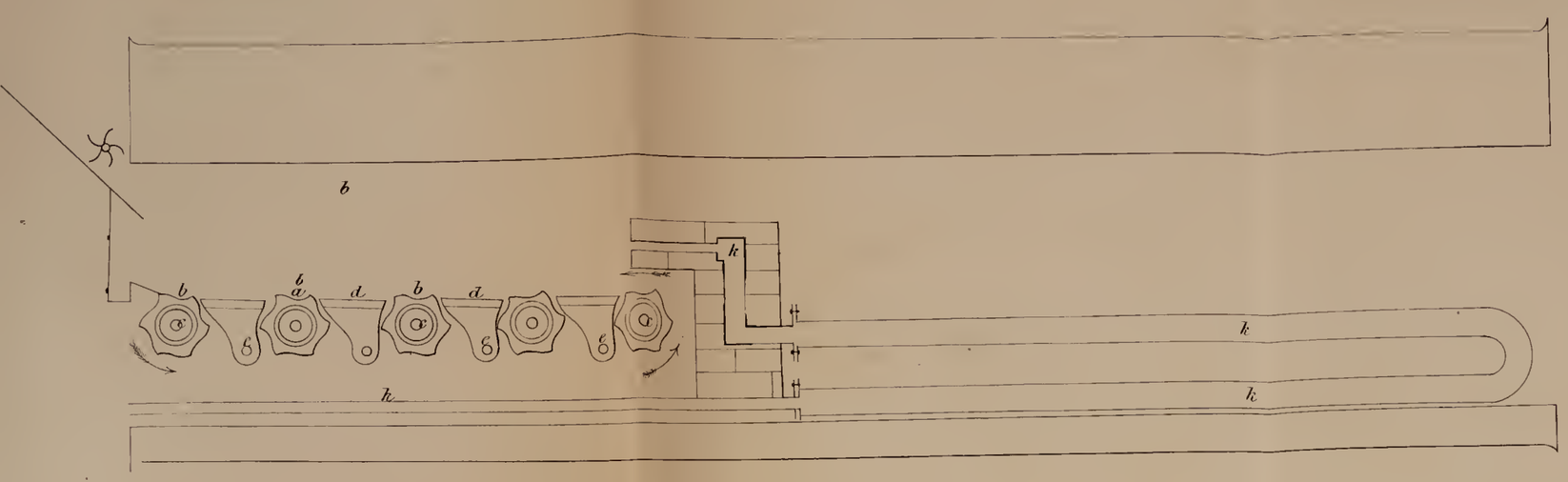


FIG. 7.

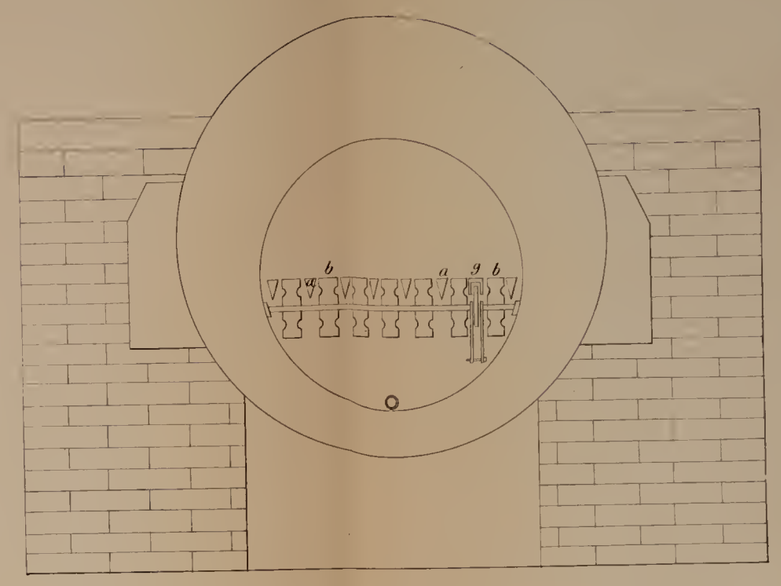


FIG. 8.

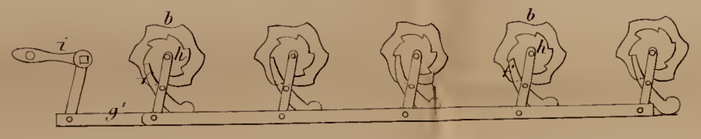


FIG. 9.

FIG. 12.

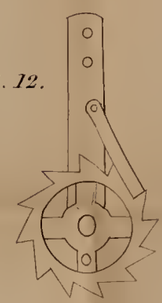


FIG. 10.

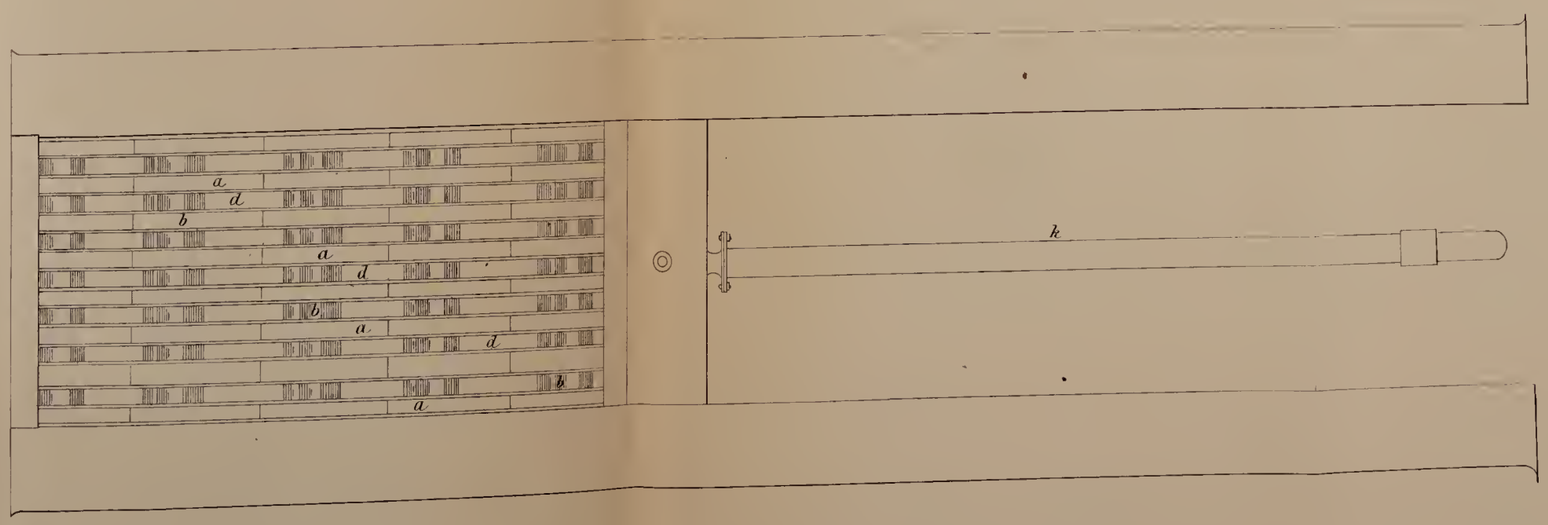
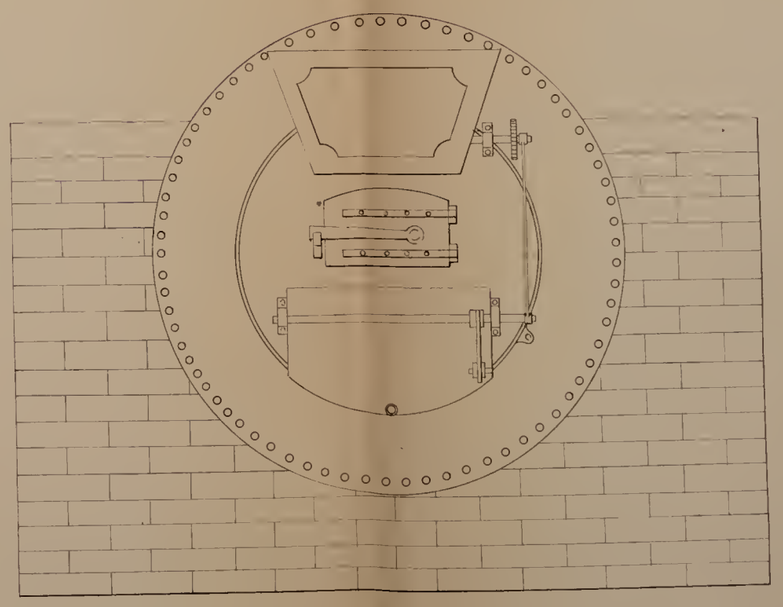


FIG. 11.



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forced into the opposite fire. x, is the shaft of the fan d, which is supported in the standards x^1, x^1. The blades are attached to arms in the ordinary manner, and there is a disc d^1, which has a boss at its centre with a pinching screw, so that it may slide on the shaft, and thus regulate the quantity of air drawn in and mixed with the smoke. y, is a rigger on the shaft x, for driving the fan. It will be seen that, according to this arrangement, the dampers are opened or closed alternately by the movement of the ash-pit doors, and that when one set of dampers are opened, the other set will be closed, and the smoke drawn off from the one furnace thrown in to be consumed in the other furnace. For the purpose of more effectually burning the smoke, by causing it to pass through the fire, I cause the fire bars of the furnace to have motion given to them so as to break up the fire, and allow the smoke and products of combustion to pass into it more freely.

Figures 6, 7, 8, 9, 10, 11, and 12, shew the mode of arranging the fire bars or surfaces so as to give up the necessary motion as applied to a single furnace boiler. a, a, are fire bars of the ordinary form, between which are placed revolving discs, b, b, mounted on cross shafts c, c; these discs are of the form shewn in Figure 8, and placed at such a level, that the tappets or projections formed on them shall come a little above the upper surface of the fixed bars a, a. d, d, are rockers or tumblers mounted on other cross shafts e, e, and placed so as to occupy the spaces between the discs, but without interfering with their revolution. Motion is given to the discs b, b, by means of the pauls or clicks f, f, which are mounted in the grooved bar g, and take into ratchet wheels h, h, on the ends of the cross shafts c, c, on which the discs are mounted. The grooved bar g, is connected at one end by a link or rod g^1, to one arm of the bell crank lever i^1, the other arm of which is connected by a rod or link to a crank pin in the side of a ratchet wheel, which receives motion by a click or pall attached to the end of a rod moved by an excentric driven from a steam engine or other power. The effect of the step by step revolving motion given to the discs b, b, and the rocking action of the tumblers, is to break up the fire, and thus

cause the smoke and air admitted or forced into the ash pit to pass more readily through the fire. The air entering the ash pit passes also to the back of it, and rises up in front of the bridge, in the space left at the inner end of the fire bar, where it meets the smoke passing towards the bridge, and becoming mixed with it, causes it to be consumed; the effect of the air thus entering the furnace may be increased by admitting water into the pipe *k*, where it becomes converted into steam, which issues through the bridge into the furnace. The admission of air, &c. to the fire, for the purpose of consuming the smoke, may be effected by fitting the furnace or fire place with fire bars of the ordinary form, and with a row of revolving discs of the form shewn in Figure 8, at the inner end immediately under the bridge, so as to keep a clear space at the back of the bars to admit air through the fire.

And having now described the nature of my said Invention, and in what manner the same is to be performed, I declare that what I claim is,—

The arranging the dampers of furnaces and fire places in such manner as to stop off the blowing into the fire during the operation of stoking.

I also claim the revolving discs and tappets for breaking up and clearing the fire, and the employment of a single row of revolving discs at the back of ordinary fire bars, all for the purpose of effecting consumption of smoke and other products of combustion.

In witness whereof, I, the said William Sorrell, have hereunto set my hand and seal, this Eleventh day of June, One thousand eight hundred and fifty-three.

WM. SORRELL. (L.S.)

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